

REMARKS

Applicants have carefully studied the outstanding Official Action. The present response is intended to be fully responsive to all points of rejection raised by the Examiner and is believed to place the application in condition for allowance. Favorable reconsideration and allowance of the application is respectfully requested.

Claims 1 - 5, 26 - 30, and 51 - 64 stand rejected under 35 USC 103a as being unpatentable over Nakao et al. (U.S. 5,909,521) in view of Olmstead et al. (6,073,851). Claims 23 - 25 and 48 - 50 stand rejected under 35 USC 103a as being unpatentable over Nakao et al., Olmstead et al., and further in view of Irino et al.

Claim 1 has been amended herein. The amendment to Claim 1 is supported by the specification as indicated in parentheses in the following annotation of Claim 1:

1. A method for enhancing the resolution of an image sensing device, comprising the steps of:

applying a periodically patterned mask to an image sensing device having a pixel sensitivity function, the device comprising a periodic array of detectors having at least one of a horizontal periodic spacing and a vertical periodic spacing (page 15, last paragraph),

the periodically patterned mask having at least one of a horizontal period which is an integer multiple of the detectors' horizontal periodic spacing and a vertical period which is an integer multiple of the detectors' vertical periodic spacing (page 15, last paragraph; page 20, last paragraph),

the mask modifying the pixel sensitivity function of the image sensing device (page 16, second paragraph), thereby to define a modified pixel sensitivity function of the device whose Fourier transform (page 15, second complete paragraph) does not have zeros at frequencies that are between 0 and the maximal frequency at which no significant aliasing occurs;

using the image sensing device with the mask to acquire multiple images of a scene from corresponding multiple fields of view related to one another by sub-pixel shifts, the multiple images defining

sub-pixel samples (page 10, last 2 paragraph; page 11, first paragraph);
and

combining the multiple images into an enhanced image of higher pixel resolution than the pixel resolutions of the multiple images, including:

computing a Fourier transform of said samples; (pages 11 - 13)

dividing said Fourier transform of said samples (Equation no.18 on page 13) by a Fourier transform of said modified pixel sensitivity function; thereby to define a quotient, and

computing an inverse Fourier transform of the quotient (page 14, second complete paragraph), thereby to define the enhanced image.

Nakao describes a multi-shot still image reader which generates multiple fields of view to obtain a higher resolution image. Olmstead describes a multi-focus optical reader with a "masked" lens, including a masked CCD detector which "receives collected light and is coupled to an adaptive exposure circuit for preventing saturation of the CCD detector at high illumination levels."

However, the new language in claim 1 recites features which are neither shown nor suggested in Nakao or in Olmstead or in any of the prior art of record either separately or in combination. For example, none of the prior art of record recites a periodically patterned mask whose period is an integer multiple of the periodic spacing of the detector, much less provision of a modified pixel sensitivity function having non-zero values in a frequency range extending up to the last frequency substantially lacking aliasing, much less combining multiple views by computing an inverse Fourier transform of a quotient formed by dividing a Fourier transform of sub-pixel samples in the views, by a Fourier transform of the modified pixel sensitivity function.

With reference to the above discussion of claim 1, claim 1 is deemed patentable vis a vis the prior art of record. Claims 2 - 5 and 23 - 25 depend directly or ultimately from claim 1 and recite additional patentable subject matter and therefore are deemed patentable a fortiori. Claim 26 is an apparatus claim corresponding generally to method claim 1 and has been amended correspondingly. Therefore, claim 26 is also deemed patentable with reference to the above discussion of claim 1. Claims 27 - 30 and 48 - 50 depend directly or ultimately from claim 26 and recite additional patentable

subject matter and therefore are deemed patentable a fortiori.

Claim 51 has been amended to depend from claim 1 and therefore is deemed allowable a fortiori. Claims 52 - 57 depend directly or ultimately from claim 51 and recite additional patentable subject matter and therefore are deemed patentable a fortiori. Claim 58 has been amended to depend from claim 26 and therefore is deemed allowable a fortiori. Claims 59 - 64 depend from claim 58 and recite additional patentable subject matter and therefore are deemed patentable a fortiori.

New claim 65 is supported by Fig. 7 and the description thereof.

The allowability of claims 6 - 22 and 31 - 47 if rewritten in independent form is noted with appreciation. Claims 6 – 8, 14 – 16, 31 – 33, and 39 - 41 have been rewritten in independent form and are therefore deemed to be allowable. Claims 9 - 13 depend ultimately or directly from claim 8 and recite additional patentable material and are therefore also deemed to be allowable. Claims 17 - 22 depend ultimately or directly from claim 16 and recite additional patentable material and are therefore also deemed to be allowable. Claims 34 - 38 depend ultimately or directly from claim 33 and recite additional patentable material and are therefore also deemed to be allowable. Claims 42 - 47 depend ultimately or directly from claim 41 and recite additional patentable material and are therefore also deemed to be allowable.

Applicant has carefully studied the remaining prior art of record herein and concludes that the invention as described and claimed in the present application is neither shown in nor suggested by the cited art.

Applicant reserves the right to pursue the claims as filed in the context of a continuation application.

In view of the foregoing remarks, all of the claims are believed to be in condition for allowance. Favorable reconsideration and allowance of the application is respectfully requested.

Respectfully submitted,

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